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(54) **Sweeping device**

(57) A sweeping device, for example for sweeping sand into paving or tiling joints, comprises a frame (1), a chassis fitted with at least three wheels (4-6) rotatable about a horizontal axis for running support of the frame,

and at least one brush element (22) which can be rotatably driven about an upright drive shaft (12) by means of a motor (13). The brush element (22) is vertically adjustable with respect to the chassis.

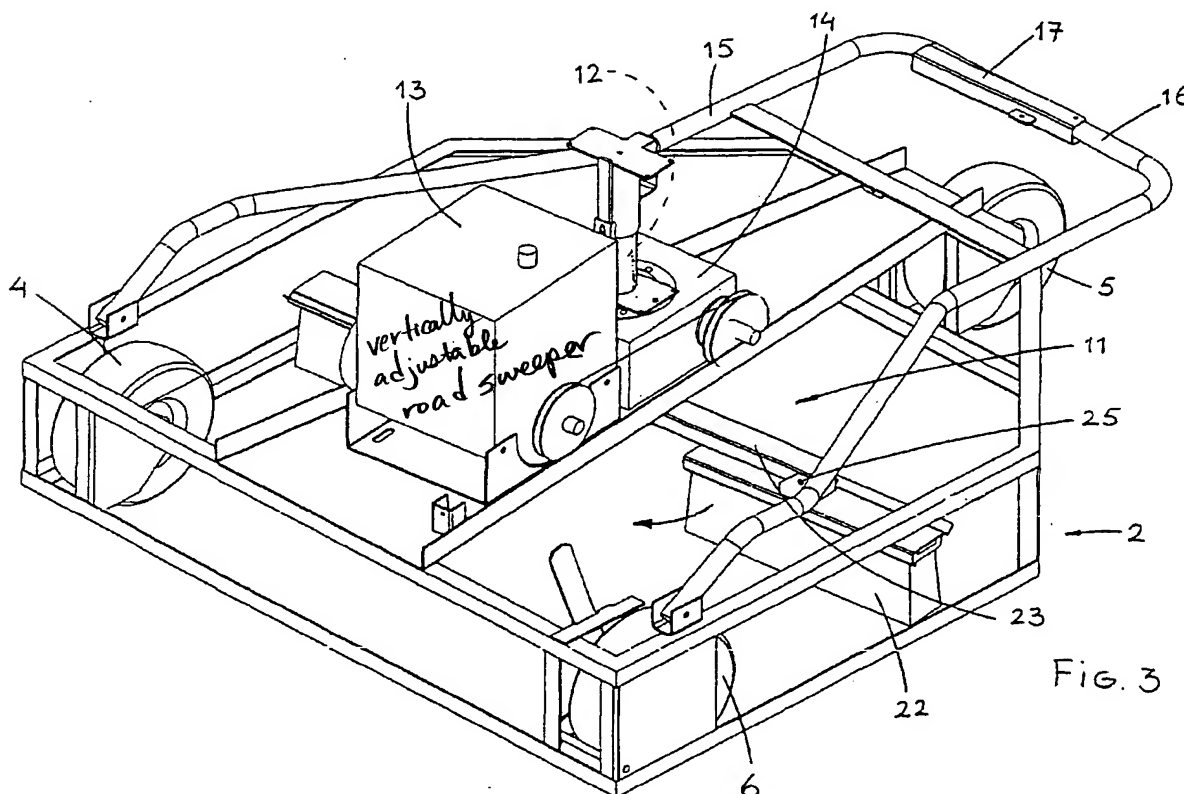


FIG. 3

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## Description

[0001] The present invention relates to a sweeping device, for example for sweeping sand into paving or tiling joints, comprising a frame, a chassis fitted with at least three wheels rotatable about a horizontal axis for running support of the frame, and at least one brush element which can be rotatably driven about an upright drive shaft by means of a motor.

[0002] A sweeping device of this kind is known from Dutch patent No. 1000876. This known device comprises a rear supporting arm fitted with a footrest and with a castor, so that the operator can stand on the sweeping device and ride on the device if said device is provided with a drive unit for the wheels. The brush is operated by means of a handle, by means of which the frame can be pivoted about the horizontal axis for lifting and lowering the brush element.

[0003] The objective of the invention is to provide an improved sweeping device:

[0004] In order to accomplish that objective, the sweeping device according to the invention is characterized in that the brush element is vertically adjustable with respect to the chassis.

[0005] This vertical adjustment of the brush element makes it possible in a simple manner to compensate for the wear of the brush element by (automatically) lowering the brush element. The operator does not need to exert a force on a handle thereby in order to keep the brush element in a particular position, which makes for pleasant working conditions. Where vertical adjustment does not take place automatically, the brush element can be adjusted to a height which is most favourable for the conditions in question. In the case of moist sand, for example, the brush element must be set to a lower position than in the case of light and dry sand.

[0006] Vertical adjustment of the brush element with respect to the chassis can be achieved by making at least one wheel adjustable with respect to the frame, for example in that said at least one wheel is suspended from an arm which is capable of pivoting movement about a horizontal transverse axis.

[0007] In an advantageous embodiment of the sweeping device according to the invention, an operating element for the vertical adjustment of the brush means is provided, which operating element can be controlled from the driver's position, because this makes it possible to change the height position in a simple manner during operation if the circumstances require so.

[0008] An advantageous embodiment of the sweeping device according to the invention is characterized in that the brush element is disposed within a circle defined by the points of contact between the wheels and the ground, seen in horizontal direction, and in that the wheel axles, which are fixed, extend parallel to each other.

[0009] In this way, a stable chassis for the sweeping device is provided, which does not require any pivoting

of the frame and which can be simply pushed or pulled, if desired, without the operator having to exert a force in vertical direction. Especially if the wheels are not capable of pivoting movement, said wheels ensure that the reaction forces from the rotating brush element are taken up by said wheels and that said forces are hardly exerted on the operator, if at all.

[0010] The invention will be explained in more detail hereafter with reference to the drawing, which shows embodiments of the sweeping device according to the invention.

[0011] Figs. 1 and 2 are a plan view and a side view respectively of the first embodiment of the sweeping device according to the invention.

[0012] Fig. 3 is a perspective view of a part of a second embodiment of the sweeping device according to the invention.

[0013] Like parts are indicated by like reference numerals in the various embodiments.

[0014] The sweeping device which is shown in the drawing comprises a frame 1, which in this case consists of a horizontal cross beam 2 and a forwardly projecting longitudinal beam 3. Mounted on the ends of said beams 2 and 3 are wheels 4, 5 and 6, respectively, which are rotatable about parallel horizontal axes. In this illustrated embodiment, the wheels are not capable of pivoting movement about a vertical axis, but they are suspended from the associated beam 2, 3 via arms 7, 8 and 9, respectively, which are each capable of pivoting movement about an axis 10 extending parallel to the axes of wheels 4 - 6. Wheels 4, 5 and 6 together form the chassis of the sweeping device.

[0015] Frame 1 supports a brush element 11 (yet to be described), which is suspended from a vertical shaft 12, which can be rotatably driven by means of a motor 13, such as a combustion engine or an electric motor. In most cases, the outgoing shaft of motor 13 will drive shaft 12 via a transmission 14. Preferably, shaft 12 can be driven at varying speeds, possibly also in opposite direction.

[0016] An operating arm 15 comprising an operating handle 16 and being disposed in the same vertical plane as longitudinal beam 3, is provided for the purpose of driving the sweeping device. An operator can push, pull and also steer the sweeping device by means of said operating arm. Means 17 for controlling motor 13 may be present on operating arm 15, near handle 16.

[0017] Operating arm 15 is furthermore fitted with a control lever 18, which is capable of pivoting movement about a horizontal axis and which is connected to links of a linkage system 19, which links of linkage system 19 engage arms 7 - 9 of wheels 4 - 6 in such a manner that pivoting movement of control lever 18 results in pivoting movement of arms 7 - 9 of wheels 4 - 6. Frame 1, and thus brush element 11, will be adjusted for height relative to the ground by the pivoting of arms 7 - 9. Control lever 18 is provided with a locking mechanism 20 comprising teeth 21, by means of which the control lever 18

and thus arms 7 - 9 of wheels 4 - 6 can be locked in various positions so as to make it possible to operate the brush element 11 at different heights relative to the ground.

[0018] In the illustrated embodiment, the brush element consists of two or four rectangular brushes 22, which are secured to a cross-like suspension 23. As is shown in the drawing, and in particular in Fig. 1, each brush 22 may be adjustably secured to suspension member 23 in such a manner that the angle in a horizontal plane between the longitudinal direction of brush 22 and the associated radial of suspension member 23 is adjustable. In this manner, suitable adjustment of brushes 22 makes it possible to sweep the sand outwards for the final sweep-in operation, or precisely to keep the sand under the device during movement thereof for the coarser preliminary sweep-in operations. Since axis 10 extends vertically, the brush element will be in contact with the ground surface during its entire revolution, thus ensuring an efficient operation.

[0019] The figures furthermore show that a provision 24 is present for preventing persons from coming into contact with the brushes while they are rotating. Said provision 24 may consist of plating or covers or the like. Also other provisions will be present so as to comply with the current standards.

[0020] Fig. 3 shows a part of the second embodiment. The main difference with the first embodiment is the fact that the drive shaft 12 fitted with brush element 11, which is shown to occupy its released position, is now freely adjustable in vertical direction, so that an automatic vertical adjustment is effected. This can take place under the influence of the self-weight of the movable parts, but also under the influence of pressure means such as a (mechanical) spring member, if desired.

[0021] In this case, brushes 22 are each capable of pivoting movement about a horizontal (radial) pivot 25. Furthermore, a rocker arm construction enables vertical movement of wheel 6, as a result of which the device can be placed in a slightly sloping position, so that the brushes 22 will only sweep flat across the ground on the side of the device remote from wheel 6. As a result of this, sand or the like will be swept to one side.

[0022] The operating arm or pushing handle 15 is collapsible so as to make it possible to position the device with the nose wheel 5 directed upwards, for example during transport.

[0023] The invention provides a sweeping device by means of which an operator can sweep sand into the joints of new paving or tiling without much effort. The device can easily be pushed ahead without reaction forces from the rotating brushes being exerted on the operator via the device. The working height of the brushes can be adjusted automatically or manually, by means of control lever 18 during use of the device, so as to obtain and maintain a satisfactory sweeping performance under varying sweeping conditions, also after some wear of the brushes

[0024] The invention is not limited to the above-described embodiment as shown in the drawing, which can be varied in several ways within the scope of the invention. Thus, the chassis could be fitted with a different number of, possibly pivot-mounted, wheels. The brush element may also consist of a large, circular brush. The device can also be adapted for other sweeping or polishing operations of other kinds of ground contact operations.

#### Claims

1. A sweeping device, for example for sweeping sand into paving or tiling joints, comprising a frame, a chassis fitted with at least three wheels rotatable about a horizontal axis for running support of the frame, and at least one brush element which can be rotatably driven about an upright drive shaft by means of a motor, **characterized in that** said brush element is vertically adjustable with respect to said chassis.
2. A sweeping device according to claim 1, wherein at least one wheel is vertically adjustable with respect to said frame.
3. A sweeping device according to claim 2, wherein said at least one wheel is suspended from an arm, which is capable of pivoting movement about a horizontal transverse axis.
4. A sweeping device according to any one of the preceding claims, wherein an operating element for the vertical adjustment of the brush means is provided, which operating element can be controlled from the driver's position.
5. A sweeping device according to claims 2 or 3, and 4, wherein said brush element is freely adjustable in vertical direction, and wherein said brush element can be held in contact with the ground surface under the influence of its own weight or under the influence of pressure means, if desired.
6. A sweeping device according to any one of the preceding claims, wherein said frame is fitted with a handle, by means of which the device can be operated and be moved by pushing or pulling.
7. A sweeping device according to any one of the preceding claims, wherein said brush element is fitted with at least two brushes, which are attached to arms which are mounted on the drive shaft, wherein preferably four arms are provided in the form of a cross.
8. A sweeping device according to claim 7, wherein

said brushes are rectangular, and wherein the angle between the longitudinal axis of the brushes and the associated radial of the drive shaft and/or the angle between the longitudinal axis of the brushes and a plane perpendicularly to the drive shaft is adjustable. 5

9. A sweeping device according to any one of the preceding claims, wherein the brush element is disposed within a circle defined by the points of contact between the wheels and the ground, seen in horizontal direction, and wherein the wheel axles, which are fixed, extend parallel to each other. 10
10. A sweeping device according to claim 1, wherein the upright shaft of the brush element is disposed vertically. 15
11. A sweeping device for sweeping sand into paving or tiling joints, which device comprises a frame, a chassis fitted with at least three wheels rotatable about a horizontal axis for running support of the frame, and at least one brush element which can be rotatably driven about an upright drive shaft by means of a motor, characterized in that the brush element is disposed within a circle defined by the points of contact between the wheels and the ground, seen in horizontal direction, and in that the wheel axles, which are fixed, extend parallel to each other. 20 25 30
12. A sweeping device according to claim 11, wherein said brush element is vertically adjustable with respect to said chassis. 35

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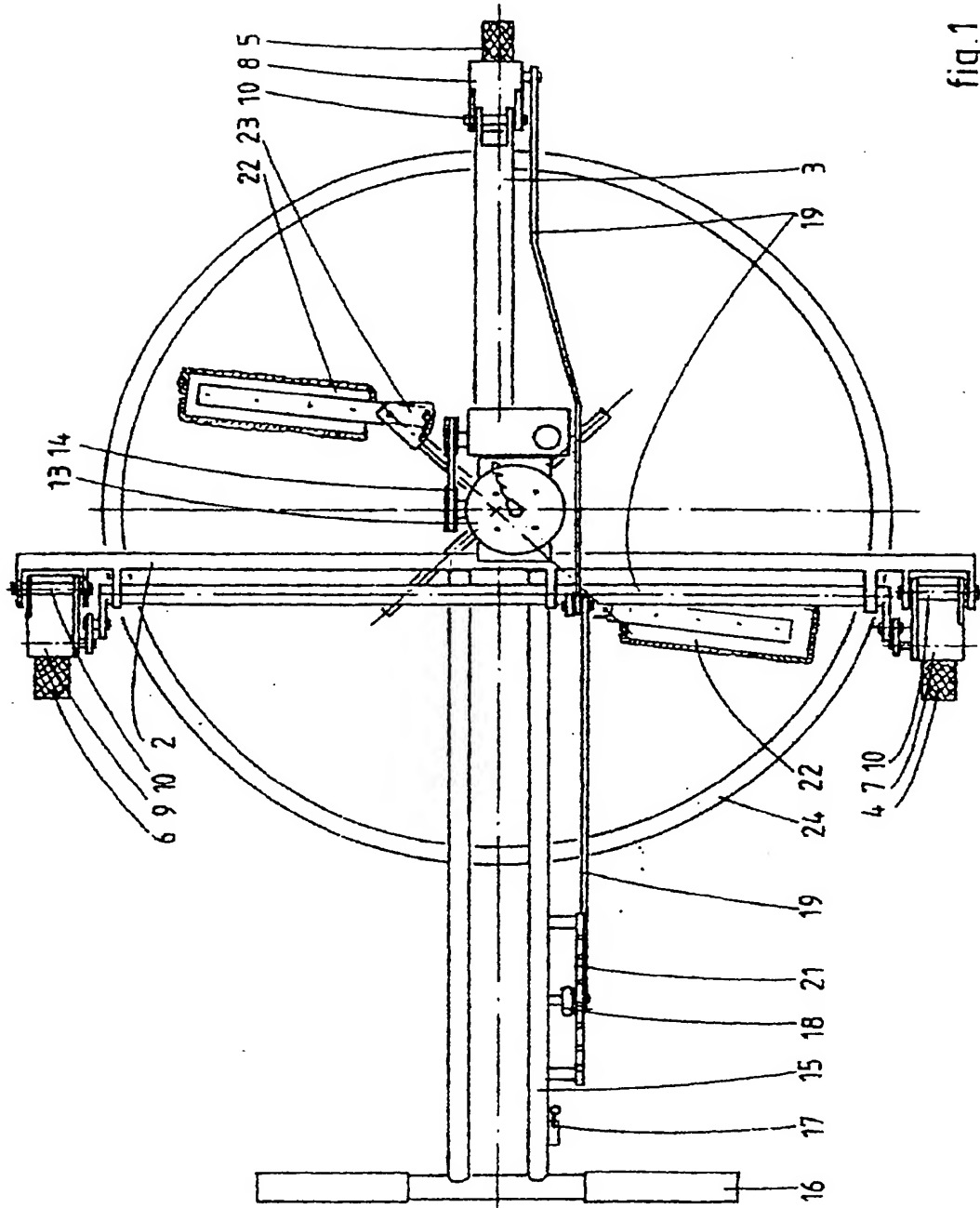


fig. 1

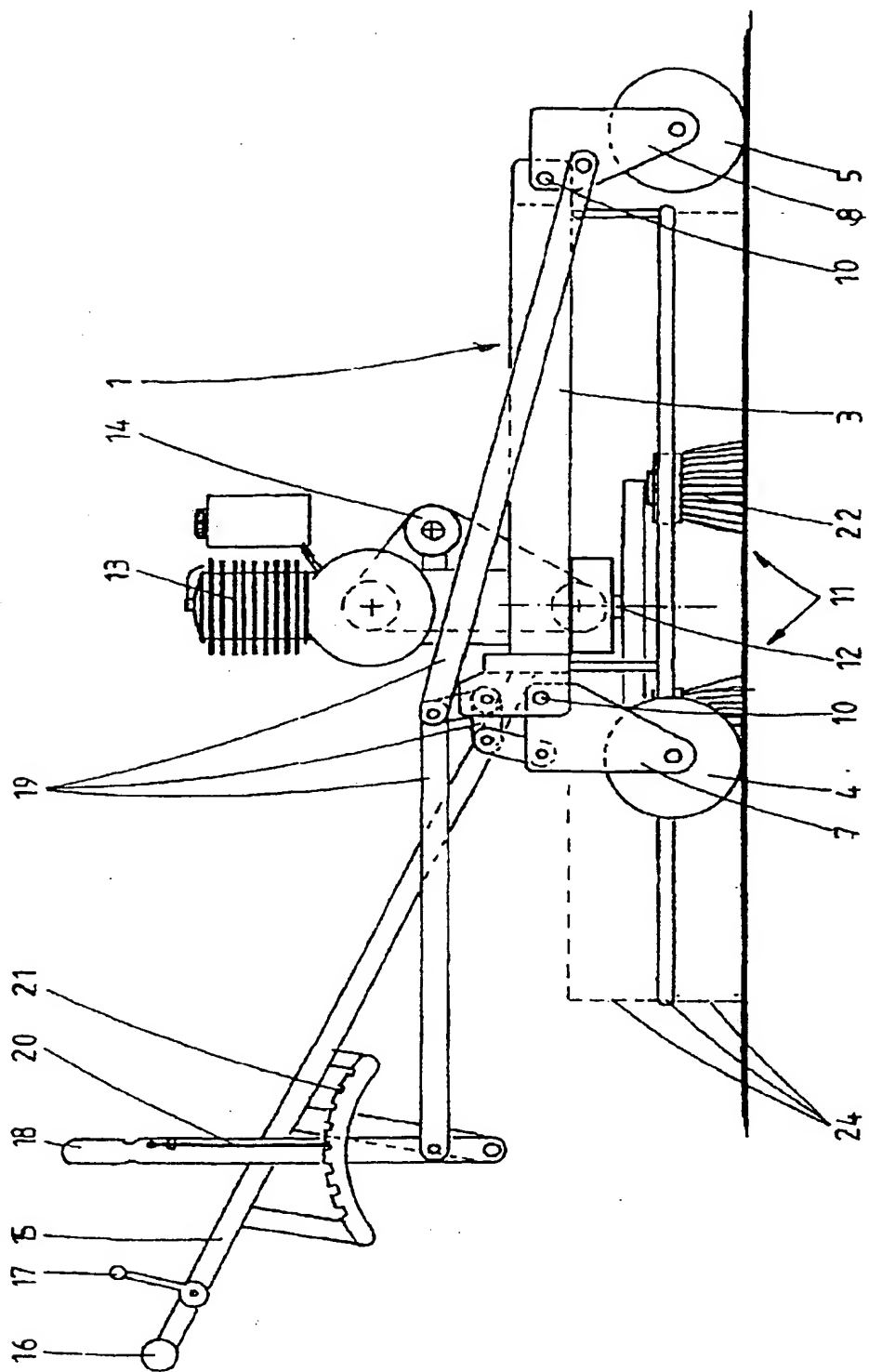


fig. 2

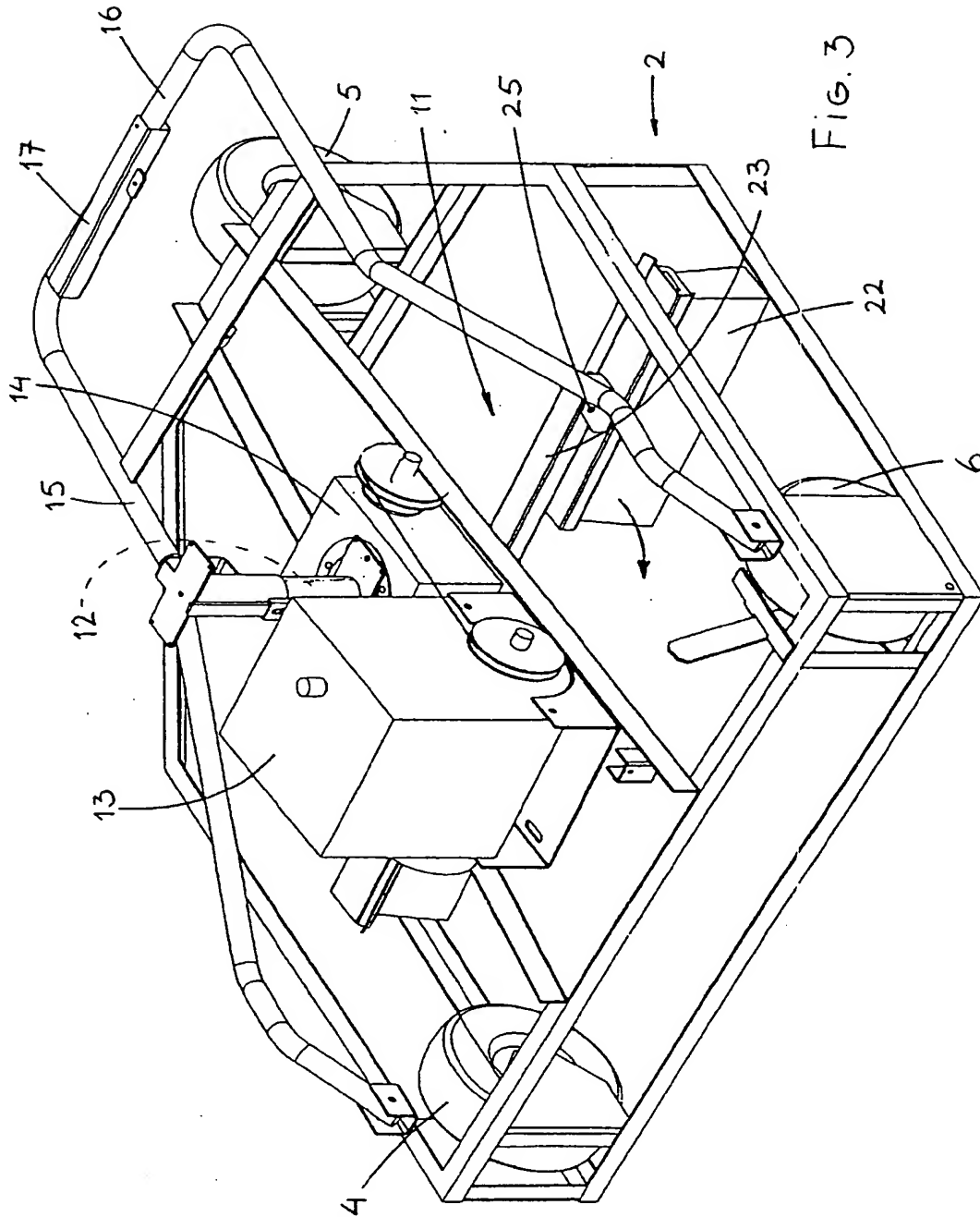
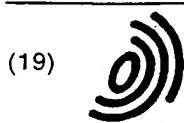


Fig. 3



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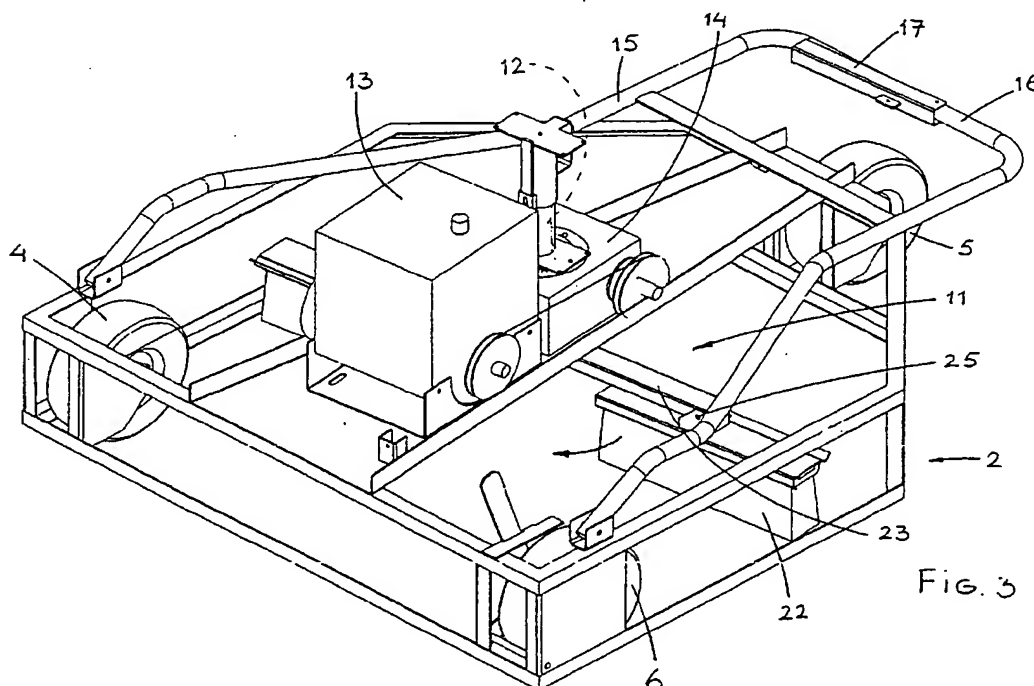


FIG. 3

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# EUROPEAN SEARCH REPORT

Application Number  
EP 99 20 0330

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	US 3 045 267 A (WAGNER RV) 24 July 1962 (1962-07-24)	1,4-12	E01H1/05
Y	* the whole document *	2,3	
Y	DE 40 19 550 A (LAMPING BERNHARD ; LAMPING MICHAEL (DE)) 24 January 1991 (1991-01-24)	2,3	
A	* claim 5; figure 2 *	1,6	
X	US 3 732 590 A (HORST E) 15 May 1973 (1973-05-15)	1,5-12	
Y	* the whole document *	2,3	
Y	US 3 947 912 A (MICHAELS ABRAHAM) 6 April 1976 (1976-04-06)	2,3	
A	* column 6, line 64 - column 7, line 16; figures 2,7 *	1	
X	US 3 115 654 A (ZIMMERMAN L) 31 December 1963 (1963-12-31)	1,6,7, 9-12	
Y	* column 2, line 8 - line 13; figures 3,4 *	8	
A		5	
Y	DE 39 11 291 C (SOBERNHEIMER MASCHINENBAU GMBH) 26 July 1990 (1990-07-26)	8	
A	* column 2, line 15 - line 18 * * column 3, line 4 - line 9 *	1	
The present search report has been drawn up for all claims			
Place of search <b>THE HAGUE</b>		Date of completion of the search <b>3 April 2000</b>	Examiner <b>Zuurveld, G</b>
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT  
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82